



Water Striders and Surface Tension

- OBJECTIVES:**
1. Clarify the difference between insects and spiders.
The Water Strider is an insect.
 2. Water molecules like to stick close together. This force is called cohesion. When still water meets air, a thin "skin" is formed on the surface of the water. The cohesion creates something called surface tension. The thin "skin" is strong enough to support light objects.
 3. There are animals that have developed body parts over time that enable them to walk on water by spreading their weight out over a wide area.
 4. Water Striders are a good example of this kind of animal. They are lightweight, and their legs have tiny hairs that repel water and capture air. By repelling water, the tiny water striders stand on the water's surface and the captured air allows them to float and move easily.
(NWF)

OVERVIEW:

Through a series of activities, students will learn about surface tension and animals that have the ability to walk on water. This lesson should be spread over three days. It is encouraged that the class be organized into working groups, and if parent helpers are available should be recruited for the hands-on activities.

STANDARDS ADDRESSED:

NGSS K. Interdependent Relationships in Ecosystems: Animals, Plants, and Their Environment

K-LS1-1: Use observations to describe patterns of what plants and animals (including humans) need to survive.

NGSS K-ESS3-1: Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.

NGSS 1. Structure, Function, and Information Processing: K-2 Engineering and Design K-2-ETS1-2:

Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

MATERIALS:

- Per Team:**
- 3 pennies
 - 3 nickels
 - 3 dimes
 - Cup of water
 - Eye dropper or straw to be used in its place
 - Paper clips
 - Sketch paper
 - Sketching materials
 - Newspaper
 - Aluminum pie plate
 - Glass of water for each team
 - Magnifying glass
 - Access to Internet

ACTIVITY STEPS:

Day 1—40 minutes—Start with questions: What happens when we get into a swimming pool? Throw a stone into a pond or lake? Can anyone in class walk across the top of water? What happens when you try? Are there any animals that can move across water without swimming?

Introduce the idea of cohesion and surface by demonstrating use of an eyedropper to place water drops one by one on a penny. Students count how many drops the penny will hold before the final one “breaks” and spills over. Work in teams with three pennies, nickels, dimes. Test each coin and predict how many drops it will take until the final drop. Use attached chart (Counting Drops of Water on a Coin) to record this information.

Extensions:

- Predict and test how many drops will fit on surface of a quarter.
- What are the differences that exist from coin to coin (besides size) that would explain the different readings? (Attributes such as shiny/dull, dirty/clean etc.)

Day 2—40 minutes—Review concepts from previous lesson. Set up newspapers to protect desktops. Set glass of water on pie plate with same size paper clips nearby. Student teams will try to get paper clips to float by first sliding/dropping one at a time into the water. This won’t work, so someone might think of gently setting it atop the water’s surface. It must be done very slowly and carefully and can be expedited by bending up one arm of a paper clip and using it as a holder to lower the other clip.

Extension:

- How many paper clips can the glass of water’s surface tension hold? Does the diameter of the container make a difference in the number of paper clips held? Can the surface tension be changed by adding other ingredients (detergent, baby powder, crayon shavings)?

Day 3—40 minutes—Find a picture of a Water Strider that can be magnified. Examine the structure of the feet pads, which enable it to rest on the surface of a quiet pond/lake. View YouTube video (<http://www.youtube.com/watch?v=RphuMEUY3Og>) on Water Strider and/or net some from a local pond and examine with magnifying glasses. Students will draw a picture of a Water Strider.

ASSESSMENT:

Design a different water bug that can travel across the surface of a still pond or lake. Must have a narrow body and foot pads.